

REMARKS

Claims 9-20 are now in the case.

The undersigned attorney for applicants appreciates the granting of an interview by Examiner Patterson on May 17, 2004 to discuss the Office Action of November 19, 2003.

Independent claims 9, 10, and 17 have been amended, claim 15 has been modified, and claim 21 has been deleted. No new matter has been added by these changes.

As discussed in the subject application, an object of the present invention is to reduce significantly the weight and thickness (volume) of an air bag while maintaining the mechanical properties of the air bag as well as durability against long term aging. The basis weight and thickness of the fabric for an improved air bag are reduced by about 20%, preferably 30% or more, when compared with a conventional base fabric used in a conventional air bag. (See application, page 3, line 30 to page 4, line 19.)

In the present invention, a significant mechanical property of the fabric is tensile work. Tensile work at break of the woven fabric forming the air bag is more relevant from a design standpoint than the tensile strength at break. In accordance with the applicants' observation, the dynamic load exerted on the air bag is larger at the stage when the air bag is projected forward to a maximum extent (e.g., Fig. 1(3)) than at the stage when the air bag inflates to a maximum extent and restrains the occupant. (See application, page 8, line 22 to page 9, line 1.) Tensile work of a fabric is generally correlated to the basis weight of the woven fabric if the kind of yarn is specified. In the

present invention, an unnecessarily large tensile work at break is contradictory because weight reduction and compactness of the present air bag are important requisites.

The woven fabric of the present invention is specified in terms of a parameter, weave fineness, which is a product of total fineness of warp or weft multiplied by weave density, the product being 16000 decitex•end/2.54 cm or less. The value range of the load at 15% elongation of the fabric is specified in order to obtain a pliable air bag that prevents occurrence of injury of the vehicle occupant at impact. The mechanical properties are maintained even after the air bag has been exposed to prolonged periods of heat-aging, wet heat-aging, and ozone-aging.

Claims 10, 11, 13, 15, and 17-21 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Toray, of record; claims 9, 14, and 16 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Toray in view of Smith, of record; and claim 12 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Toray in view of Mizuki, of record. All three rejections are respectfully traversed.

At the interview, there was a discussion of the mechanical and physical features of the independent claims. In the independent claims 9, 10, and 17, the distinguishing physical or mechanical properties include, inter alia:

- 1) the yarns contain a plurality of single filaments, each filament having a fineness in the range of 1 to 3.3 decitex and the yarns having a total fineness in the range of 66 to 167 decitex;
- 2) the product of fineness of warp and weft of the fabric multiplied by the weave density is not more than 16000 decitex•end or pick/2.54 cm;
- 3) the fabric has a load at 15% tensile elongation in the range of 3 to 35 N•%/2.54 cm and a tensile work at break in the range of 7000 to 30000 N•%/2.54cm.

The Toray document was discussed extensively in the Submission of August 25, 2003, and this discussion is incorporated by reference herein. As to feature 1) above, the total Toray yarn size cannot be formed practically smaller than 210 denier which is stated to be the desirable minimum. Thus, there is no overlap between Toray and the claimed range of 67 to 167 decitex.

As to feature 2), it is submitted that the range of 21000-31000 of Toray is at an entirely different level from the property of weave fineness recited in the claims even though the fabrics of Toray and the claims have almost the same cover-factor values. This property of weave fineness is the product of fineness of warp and weft in the fabric multiplied by the weave density, the product being not more than 16000 decitex•end or pick/2.54 cm. Thus, this difference between Toray and this claimed property makes clear that not only is Toray out of the scope of the claims, but also there can be no overlap between the respective values of this property.

In feature 3) , the value range of load at 15% elongation of the fabric provides a soft and pliable air bag that is designed to prevent occurrence of injury of the vehicle occupant at impact. The tensile work at break of the woven fabric is a significant mechanical property by which kinetic energy is absorbed and breakage of the air bag prevented at maximum projection. This property is not addressed by Toray as the Examiner admits. Even an estimated tensile work at break for Toray would be well outside the claimed range, again preventing an overlap of the respective ranges.

The inapplicability of In re Boesch and Slaney, 205 U.S.P.Q 215 (CCPA 1980), was raised by applicants' attorney at the interview. It was noted that this case pertained to an alloy recipe employing an equation for eliminating an undesirable property. The

two pieces of prior art cited in the case overlapped the percent ranges of the constituents of the claimed alloy. In contrast and as noted above, at least three ranges of the present claims are not overlapped by Toray. Additionally, in Boesch and Slaney, and again in contrast to the facts here, there was a third piece of prior art, namely, a patent to Linus Pauling, which together with the overlap suggested the kind of experimentation necessary to achieve the claimed composition.

It is submitted that the cited case of Boesch and Slaney is inapposite to the facts of this case, both because of the lack of overlap as described above and the lack of a reference that points to the differences between Toray and the claims. Thus, in all respect to the Examiner's position, there is here no routine optimization of the claimed properties, and all of the claims distinguish over Toray as well as the secondary reference to Smith and Mizuki. As discussed in the prior Submission, neither secondary reference corrects the shortcomings of Toray, and the discussions in the Submission regarding them are herein incorporated by reference.

The Examiner referred to the absence of a showing of unexpected results. As understood, a showing of unexpected results does not appear to be a requirement in mechanical cases. Nevertheless, as has been pointed out previously and described in the subject application, the present invention provides a lighter and thinner air bag in which weight and volume are significantly reduced--by 20% or preferably 30%--yet the air bag maintains the specified mechanical/physical properties during long-term aging while exposed to conditions of heat-aging, wet heat-aging, and ozone-aging.

Reconsideration and allowance of claims 9-20 are earnestly solicited.

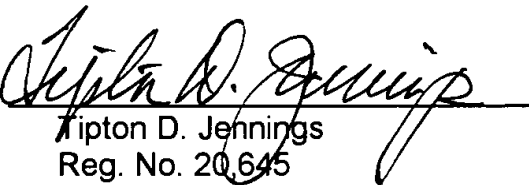
Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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